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UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))	Attorney Docket No.	Levy SR
	First Inventor or Application Identifier	Kenneth L. Levy
	Title	Recoverable digital content degradation methods and apparatus
	Express Mail Label No.	EI 847189822US

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231	
1. <input checked="" type="checkbox"/> * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing)	5. <input type="checkbox"/> Microfiche Computer Program (Appendix)	
2. <input checked="" type="checkbox"/> Specification [Total Pages 12] (preferred arrangement set forth below) - Descriptive title of the Invention - Cross References to Related Applications - Statement Regarding Fed sponsored R & D - Reference to Microfiche Appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings (if filed) - Detailed Description - Claim(s) - Abstract of the Disclosure	6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. <input type="checkbox"/> Computer Readable Copy b. <input type="checkbox"/> Paper Copy (identical to computer copy) c. <input type="checkbox"/> Statement verifying identity of above copies	
3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 1]	ACCOMPANYING APPLICATION PARTS 7. <input checked="" type="checkbox"/> Assignment Papers (cover sheet & document(s)) 8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee) 9. <input type="checkbox"/> English Translation Document (if applicable) 10. <input checked="" type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input checked="" type="checkbox"/> Copies of IDS Citations 11. <input type="checkbox"/> Preliminary Amendment 12. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 13. <input checked="" type="checkbox"/> * Small Entity Statement(s) <input checked="" type="checkbox"/> Statement filed in prior application, Status still proper and desired (PTO/SB/09-12) 14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed) 15. <input type="checkbox"/> Other:	
4. Oath or Declaration [Total Pages 13] a. <input type="checkbox"/> Newly executed (original or copy) b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed) i. <input type="checkbox"/> <u>DELETION OF INVENTOR(S)</u> Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).		
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17. **CORRESPONDENCE ADDRESS**

☐ Customer Number or Bar Code Label (Insert Customer No. or Attach bar code label here) or ☒ Correspondence address below

Name	Kenneth L. Levy				
Address	110 NE Cedar St				
City	Stevenson	State	WA	Zip Code	98643
Country	USA	Telephone	509-427-5374	Fax	509-427-7101

Name (Print/Type)	Kenneth L. Levy	Registration No. (Attorney/Agent)	
Signature	<i>Kenneth L. Levy</i>	Date	3/9/00

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**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR**

Docket Number (Optional)

Levy SR

Applicant, Patentee, or Identifier: Kenneth L. Levy

Application or Patent No.: _____

Filed or Issued: 3/10/00

Title: Recoverable digital content degradation Method and Apparatus

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☐ No such person, concern, or organization exists.
☒ Each such person, concern, or organization is listed below.

Acoustic Information Processing Lab, LLC | Digimarc
110 NE Cedar St | 19001 SW 22nd Ave. Suite 230
Stevenson, WA 98648 | Tualatin OR 97062

Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

Kenneth L. Levy
NAME OF INVENTOR

NAME OF INVENTOR

NAME OF INVENTOR

[Signature]
Signature of inventor

Signature of inventor

Signature of inventor

3/9/00
Date

Date

Date

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**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN**

Docket Number (Optional)

LevySR

Applicant, Patentee, or Identifier: Kenneth L. Levy

Application or Patent No.: _____

Filed or Issued: 3/10/00

Title: Reversible digital content degradation: Method and apparatus

I hereby state that I am

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN Acoustic Information Processing Lab, LLC

ADDRESS OF SMALL BUSINESS CONCERN 110 NE Cedar Street, Stevenson WA 98648

I hereby state that the above identified small business concern qualifies as a small business concern as defined in 13 CFR Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, SW, Washington, DC 20416.

I hereby state that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern, or organization having rights in the invention must file separate statements as to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization having any rights in the invention is listed below:

- ☐ no such person, concern, or organization exists.
☒ each such person, concern, or organization is listed below.

Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

NAME OF PERSON SIGNING Kenneth L. Levy

TITLE OF PERSON IF OTHER THAN OWNER President

ADDRESS OF PERSON SIGNING 110 NE Cedar Street, Stevenson WA 98648

SIGNATURE Kenneth L. Levy

DATE 3/9/00

Applicant or Patentee: Kenneth L. Levy Ref. No. _____
Serial or Patent No.: _____ Filed or Issued: Herewith
For: METHOD AND APPARATUS FOR INTELLIGENT CONTENT SCRAMBLING

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR §1.9(f) and §1.27(c)) -- SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ The owner of the small business concern identified below:
☒ An official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Digimarc Corporation
ADDRESS OF CONCERN 19801 SW 72nd Avenue, Suite 250, Portland, Oregon 97062

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR §121.3-18, and reproduced in 37 CFR §1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled

METHOD AND APPARATUS FOR INTELLIGENT CONTENT SCRAMBLING

By inventor(s) Kenneth L. Levy

Described in: ☒ The Application Filed Herewith.
☐ Application No. _____ Filed _____
☐ Patent No. _____ Issued _____

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR §1.9(c) if that person made the invention or by any concern which would not qualify as a small business concern under 37 CFR §1.9(d), or a nonprofit organization under 37 CFR §1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR §1.27)

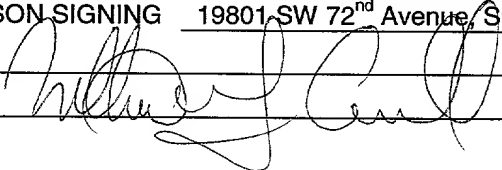
FULL NAME _____
ADDRESS _____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR §1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING William Y. Conwell
TITLE OF PERSON OTHER THAN OWNER Vice-President, Intellectual Property
ADDRESS OF PERSON SIGNING 19801 SW 72nd Avenue, Suite 250, Tualatin, OR 97062

SIGNATURE  DATE 3/9/00

RECOVERABLE DIGITAL CONTENT DEGRADATION:
METHOD AND APPARATUS

This application claims the benefit of Provisional
5 Patent Applications Ser. #60/123,581 filed 3/10/99,
incorporated herein by reference.

Background of the Invention

It is desirable to degrade digital signals in many
10 situations so as to restrict access. For instance,
pay-TV broadcasts are degraded so those who haven't
paid for the program cannot watch it because the
picture is unclear, while those who have paid for the
program see a clear picture because their recovery
15 apparatus has been enabled. Most recently, as a result
of the digital audio revolution, it is desirable to
restrict MP3 (a standard bit-rate compressed audio file
format) access. It is also desirable to produce
inexpensive portable MP3 players, which in turn require
20 that recovery of the original signal be simple.

There are numerous existing methods of degrading
digital content, a.k.a. scrambling. Some methods
require a key to de-scramble the content, whereas
others do not. Most scrambling or degrading methods
25 are based upon either adding an interference signal to
the digital content, or moving the bits around. Other
methods use encryption, but this is very
computationally intense.

30 Summary of the Invention

This invention degrades digital signals and
recovers them using a method and corresponding
apparatus that is extremely simple and efficient to
implement. In addition, most configurations of the
35 invented method and apparatus allow self-

synchronization, which means the digital content can be recovered when accessed at any random part of the content. The invented process also has configurations where the original digital data can be recovered from the degraded digital data with or without the need for a key. Finally, the degradation level can be controlled such that the digital content can either be previewed in lower quality before buying, or made totally useless.

10 The invented degradation process involves searching through the original digital data for detection criteria and then adjusting neighboring points to degrade the content, either without affecting the location of the detection criteria or affecting it in a known fashion so that the original signal may be recovered. The detection criteria may include the relationship between several points, or be as simple as a threshold crossing or include every M^{th} point. The adjustment of the neighboring points may be as simple as multiplying the point after the threshold crossing by N . It is advantageous if N is less than one but not equal to zero so saturation and data points equal to zero are not a problem, and if the threshold is positive and the data is decreasing towards zero during the threshold crossing.

25 The invented recovery process includes searching through the data for the detection criteria and then re-adjusting neighboring points to their original value. For example, if the adjustment in the degradation process uses multiplication by N , the recovery process multiplies by $1/N$.

35 The corresponding apparatus includes a logical processor and memory unit. The logical processor is used to search for the detection criteria, then either adjust to degrade or re-adjust to recover the original

data point(s). The memory unit is used to hold the previous point(s) necessary to find the criteria location, and the buffer, if using buffered data.

5 Brief Description of the Drawings

FIG. 1 is an overview of the degradation and recovery process.

FIG. 2 is the pseudocode for the degradation and recovery process.

10 FIG. 3 is a simple and efficient example of the degradation and recovery process using a threshold crossing and adjusting only the next point.

FIG. 4 is the pseudocode for the simple and efficient example of the degradation and recovery
15 process.

FIG. 5 is an overview of the apparatus required to implement the invented process.

Detailed Description

20 Below please find the definitions to terms and concepts that are used throughout this document. Digital content refers to digital data representing a perceived physical item, including but not limited to audio, video, and images. Digital data refers to the
25 grouping of bits (1's or 0's) that represent a sample of the original digital content at an instant in time. Each bit group is equivalently referred to as a data point or sample. The data points are arranged in an order, many times representing a sequence versus time
30 or frequency. In addition, the data points may be grouped again to form a subgroup, possibly used to represent a sequence versus frequency versus time, as is the case in MPEG standard compressed digital audio and video. Most importantly, the digital data has an
35 order, with a beginning and end, such that searching

the data is possible, and neighboring points can be defined as points close to each other. Finally, point(s) refer to one or several points.

Fig. 1 displays an overview of the degradation and recovery process, and Fig. 2 displays the corresponding pseudocode to be implemented by the apparatus.

To degrade the digital content (box 100), the samples are searched for the detection criteria (boxes 200, 210 and 220). The searching stops after the last data point in the buffer has been examined (box 210), and a new buffer may be presented if available. As known in the state of the art, data values must be saved between buffers and properly initialized for the first buffer so as the initial points are properly searched.

When the detection criteria are found, the neighboring data point(s) are adjusted so as to cause content degradation (box 230). The adjustment of these points should not change the location of the detection criteria or change it in a known fashion; otherwise, the detection of the correct location to re-adjust the data to its original value (recovery) is not easy. In addition, it is desirable to prevent the adjustment from causing saturation or resulting in a value of zero, because then the original data point(s) will not be easily recoverable.

To recover the original digital content (box 110), the degraded data is searched for the detection criteria defined by the degradation process (box 200, 210, and 220). If the degradation process has changed the detection criteria in a known fashion, then the detection criteria in box 220 for recovery is different than that used in degradation. When the criteria location is found, the neighboring data point(s) are re-adjusted by the inverse of the method used in the

degradation process (box 230).

An example of this process is shown in Figs. 3 and 4. In this case (boxes 300 and 310), the detection criterion is a threshold crossing (using c-notation: $x[n-1] > \text{thr} \ \&\& \ x[n] < \text{thr}$) with a positive threshold ($\text{thr} > 0$) while the data goes towards zero (boxes 400, 410 and 420). The neighboring point(s) include only the point after the threshold crossing (box 430). To degrade the data, the adjustment involves multiplying the data point after the threshold crossing ($x[n]$) by N, where N is less than 1 (box 430). By reducing the value of this data point, the detection criteria location is not changed. In addition, the closer N is to 0 (but not equal to 0), the more the digital content is degraded. To recover the original digital data, the point after the threshold crossing ($x[n]$) is multiplied by $1/N$ (box 430). Care has to be taken that quantization errors do not degrade the recovered content quality. Obviously, without quantization, the recovered content will be identical to the original content.

There are additional simplistic detection criteria that can be used. For example, every M^{th} data point may be degraded. In this case, synchronization for recovery may require scanning the data for M points until the correct degraded locations are found. In addition, peak values could be used, and the point after the peak could be reduced in value. As desired, this will not affect the detection criteria for the recovery process. Alternatively, threshold crossings with a negative threshold and the data moving towards zero are viable. Again, the data point after the threshold is reduced in absolute value towards but not equal to zero. For these last two cases, synchronization for recovery automatically occurs when

searching the data.

Although, in this preferred configuration, the detection criteria do not change between degrading and recovering the original digital data, this is not an
5 absolute requirement. The detection criteria may change, if in a known fashion, such that the recovery process uses a different but known detection criteria than the degradation process. In other words, box 420 (or 220, as discussed above) would be different for the
10 degradation and recovery process.

The original content need not be represented by digital samples versus time, as one may have assumed. In many cases, such as using MPEG compression (i.e. MP3 audio), the digital samples represent subgroups of
15 frequencies versus time. In this case the data may be searched across frequency for each subgroup, or across time for each frequency, or in any other but well-defined combination. The data may also represent either the frequency magnitude or corresponding scaling
20 factors.

It is important to note that there are alternative ways to recover the content while removing most of the perceptual degradation caused by this degradation technique. For example, a pirate could use a low-pass
25 filter to render reasonable content from the degraded content. The recovered digital data will not exactly match the original digital data, but its perception may be acceptable. As well know by one familiar with the state of the art in DSP, filter characteristics such as
30 type and order will affect the recovered data.

Alternatively, one could use pseudo-random sequences (a.k.a. a key) to set the detection criteria (box 220) or the adjustment or re-adjustment of the data (box 230). This randomness increases the
35 difficulty to illegally recover the data. For example,

a pseudo-random number greater than zero but less than one could be used as the scaling value N (box 430).

Or, a pseudo-random number between minimum and maximum threshold could be used for the threshold (box 420).

5 All that matters is that the degradation and recovery process use the same pseudo-random sequence. However, this configuration requires sending a key along with the data. The key may be embedded within the data using known techniques, such that the original data is
10 still recoverable from the degraded data.

Fig. 5 shows the hardware apparatus required to implement the invented degradation and recovery processes. The hardware includes a logic processor 500 and a storage unit 510. The logic processor 500 may be
15 defined as the equivalent of a digital signal processor (DSP), general-purpose central processing unit (CPU), or a specialized CPU, including but not limited to media processors. A likely DSP chip is one of the Texas Instruments TMS320 product line. A CPU could
20 include one of Intel's Pentium line or Motorola/IBM's PowerPC product line. The design of code for controlling logic processor 500 is simple for someone familiar with the state of the art given the above pseudo-code and description. The storage unit 510
25 includes RAM when using a digital processor, and is required to store the current buffer and/or previous point(s) for the detection criteria.

In addition, a person familiar with the state of the art could implement the logic processor 500 with
30 analog and digital circuitry, either separately or in an application specific integrated circuit (ASIC). The analog and digital circuitry could include any combination of the following devices: digital-to-analog converters (D/A), comparators, sample-and-hold
35 circuits, delay elements, analog-to-digital converters

(A/D), and programmable logic controllers (PLC).

In summary, the main advantage of this invention is that it is an extremely simple and efficient method and apparatus to protect content as compared to prior-art scrambling and encryption methods.

The foregoing descriptions of the preferred embodiments of the invention have been presented to teach those skilled in the art how to best utilize the invention. Many modifications and variations are possible in light of the above teaching. For example, as discussed, there are many detection criteria and adjustment schemes that are similar to those described. To this end, the following claims define the scope and spirit of the invention.

15

Claims

I claim:

1. A process that includes searching the digital data for detection criteria and adjusting neighboring point(s), whereby the digital data is degraded in quality but the original signal is recoverable.
2. The process of claim 1 in which the detection criteria involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.
3. The process of claim 1 in which the adjustment of neighboring point(s) involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.
4. The process in claim 1 in which the detection criteria includes a threshold crossing, thereby the degradation process is simple and efficient.
5. The process in claim 4 in which the value of the threshold is a pseudo-random sequence, thereby increasing the difficulty of illegally recovering the original signal.
6. The process in claim 4 in which adjustment of neighboring points includes scaling the point after the threshold crossing, whereby the degradation process is simple and efficient.
7. The process of claim 6 in which the scaling value is a pseudo-random sequence, whereby increasing the difficulty of illegally recovering the original signal.
8. The process in claim 1 in which every Mth point is degraded in quality.
9. The process in claim 1 in which the content is recovered with a filter that removes most of the content degraded.

10. A process which includes searching the digital data for detection criteria and re-adjusting neighboring point(s) whereby the original digital data is recovered from the degraded data.

5 11. The process of claim 10 in which the detection criteria involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.

10 12. The process of claim 10 in which the adjustment of neighboring point(s) involves a pseudo-random sequence, thereby increasing the difficulty to illegally removing the content degradation.

15 13. The process in claim 10 in which the detection criteria includes a threshold crossing whereby the recovery process is simple and efficient.

20 14. The process in claim 13 in which adjustment of neighboring points includes re-scaling the point after the threshold crossing by the inverse of the scaling value used in degradation, whereby the recovery process is simple and efficient.

25 15. The process in claim 10 in which every Mth point is recovered from the degraded digital data.

16. An apparatus consisting of a logic processor and storage unit with a means to implement the efficient and self-synchronizing degradation or recovery process, whereby the apparatus is inexpensive.

30 17. The apparatus of claim 16 in which the logic processor is a digital processor.

18. The apparatus of claim 17 in which the memory unit is digital random access memory (RAM).

35 19. The apparatus of claim 16 consisting of a combination of custom digital and analog

circuitry.

20. The apparatus claim 16 which implements a filter that removes most of the degraded content.

Abstract of the Disclosure

In many situations, it is desirable to restrict access to digital content. This invention presents an extremely efficient and simple method and apparatus to
5 degrade and recover digital content. The invented process is based upon searching the data for detection criteria and then adjusting neighboring point(s) to degrade the content, or re-adjusting the neighboring point(s) to recover the original content. For example,
10 one could search for threshold crossings, and scale the following point by a number between 0 and 1 for degradation, or re-scale the following point by the inverse scaling value to recover the original data. The apparatus includes a logic processor and storage unit
15 to implement the degradation and recovery process.

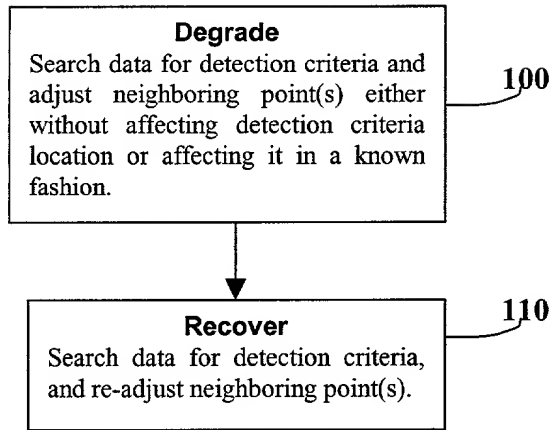


Fig. 1

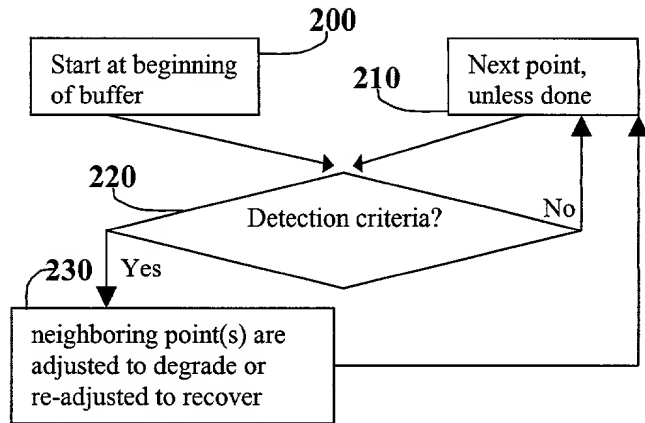


Fig. 2

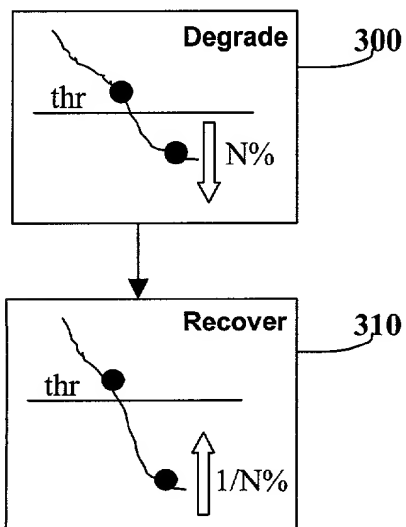


Fig. 3

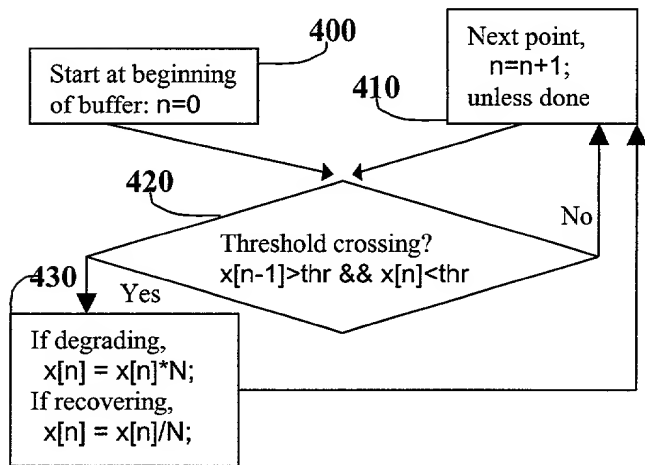


Fig. 4

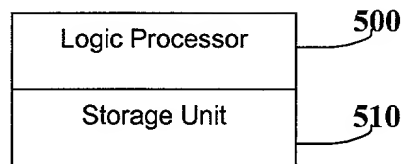


Fig. 5

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Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**DECLARATION FOR UTILITY OR
DESIGN
PATENT APPLICATION
(37 CFR 1.63)**

☒ Declaration Submitted with Initial Filing **OR** ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number

Levy SR

First Named Inventor

Kenneth L Levy

COMPLETE IF KNOWN

Application Number

/

Filing Date

3/10/00

Group Art Unit

Examiner Name

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Recoverable Digital Content Degradation Method and Apparatus

the specification of which

(Title of the Invention)

☒ is attached hereto
OR

☐ was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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60/123,581	3/10/99	

[Page 1 of 2]

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U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

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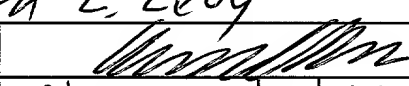
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:

☐ A petition has been filed for this unsigned inventor

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City		Country	USA

☐ Additional inventors are being named on the _____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto